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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/063,331	04/12/2002	David M. Fried	BUR920010172	8745

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EXAMINER
PHAM, HOAI V

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SM

Office Action Summary	Application No.	Applicant(s)	
	10/063,331	FRIED ET AL.	
	Examiner	Art Unit	
	Hoai v. Pham	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2005*.

2a)☒ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6,8,10,11,20,24,25 and 29-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10,11,20,24,25,29-31 and 33* is/are allowed.

6)☒ Claim(s) *1,4,6,8,32 and 34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 6, 8 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. [U.S. Pat. 6,407,442] previously applied, in view of Matsumoto et al. [U.S. Pat. 6,069,060] newly cited.

With respect to claim 1, Inoue et al. (fig. 2, cols. 4-6) discloses a capacitor formed on a substrate (101), comprising:

a Fin structure (103) having a top surface and a first side surface opposite a second side surface, said Fin structure including conductivity enhancing dopant ions in a semiconductor material (see col. 4, lines 62-63);

an insulator structure (104) adjacent the top surface of the Fin structure (see col. 4, line 64); and

a conductor structure (105a) adjacent the insulator structure (see col. 4, lines 64-65), wherein all conducting material on a top surface of the insulator structure is continuously distributed on the top surface of the insulator structure (144) and is comprised by the conductor structure (105a), wherein the conductor structure partially but not totally overlays the Fin structure, and wherein a thickness of the conductor structure is within a thickness of the Fin structure, said thickness of the Fin structure being a distance between the first and second side surfaces of the Fin structure, said thickness of the conductor structure being oriented in a same direction as said thickness of the Fin structure, said insulator structure comprising a single insulative material distributed from the top surface of the Fin structure to a bottom surface of the conductor structure (see fig. 2).

Inoue et al. does not disclose the Fin structure including a single-crystal semiconductor material. However, Matsumoto et al. discloses that it is known in the art for the lower electrode (10c) formed of single-crystal semiconductor material (see col. 6, lines 28-36 and col. 14, lines 47-57). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to select single-crystal semiconductor material as known materials, as taught by Matsumoto et al. into the device of Inoue et al. in order to form the surface of the lower electrode can be flattened which prevent concentration of electric fields into the surface of the lower electrode in the capacitor (see col. 14, lines 47-57). Moreover, selection of a known material based

on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).

With respect to claim 6, Inoue et al. does not teach the exact height range of their Fin structure, as claimed by Applicant. However, the height range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to select the height range of the Fin structure in an integrated circuit for different application.

With respect to claim 8, Inoue et al. discloses that a FinFET (110, 111) is disposed on the substrate, the FinFET having a gate electrode (105) coupled to said conductor structure (see fig. 13).

With respect to claim 34, Matsumoto et al. discloses that the thickness of the Fin structure (10c) is greater than 40 nm (see col. 4, lines 34-36).

4. Claims 1, 4, 6, 32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Natsume [U.S. Pat. 5,356,826] previously applied, in view of Ting [U.S. Pat. 5,838,032] previously applied.

With respect to claim 1, Natsume (fig. 12, cols. 4-6) discloses a capacitor formed on a substrate (100), comprising:

a Fin structure (L1) having a top surface and a first side surface opposite a second side surface, said Fin structure including polycrystalline silicon material (see col. 5, lines 1-3);

an insulator structure (1) adjacent the top surface of the Fin structure (L1) (see col. 5, line 10-15); and

a conductor structure (L2) adjacent the insulator structure (1) (see col. 6, lines 5-12), wherein all conducting material on a top surface of the insulator structure is continuously distributed on the top surface of the insulator structure (1) and is comprised by the conductor structure (L2), wherein the conductor structure partially but not totally overlays the Fin structure, and wherein a thickness of the conductor structure is within a thickness of the Fin structure, said thickness of the Fin structure being a distance between the first and second side surfaces of the Fin structure, said thickness of the conductor structure being oriented in a same direction as said thickness of the Fin structure, said insulator structure comprising a single insulative material (see col. 5, lines 10-11) distributed from the top surface of the Fin structure to a bottom surface of the conductor structure (see fig. 12).

Natsume does not disclose the Fin structure including a single-crystal semiconductor material. However, Matsumoto et al. discloses that it is known in the art for the lower electrode (10c) formed of single-crystal semiconductor material (see col. 6, lines 28-36 and col. 14, lines 47-57). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to select single-crystal semiconductor material as known materials, as taught by Matsumoto et al. into the device of Natsume in order to form the surface of the lower electrode can be flattened which prevent concentration of electric fields into the surface of the lower electrode in the capacitor (see col. 14, lines 47-57). Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).

With respect to claim 4, Natsume discloses that the conductor structure (L2) includes a conductive material consisting of a metal (see col. 6, lines 8-11).

With respect to claim 6, Natsume does not teach the exact height range of their Fin structure, as claimed by Applicant. However, the height range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no

disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to select the height range of the Fin structure in an integrated circuit for different application.

With respect to claim 32, Natsume discloses that an insulator layer (3) such that an entire bottom surface of the Fin structure (L1) is in direct mechanical contact with a top surface of the insulator layer (3); and an insulation film (8) on the side surface of the Fin structure (L1) and direct mechanical contact with the first side surface of the Fin structure, wherein the insulator structure has a lower surface and an upper surface such that a height of the lower surface of the insulator structure above the top surface of the insulation film is less than a height of the upper surface of the insulator structure above the top surface of the insulator layer, and wherein a height of a top surface of the insulation film above the top surface of the insulator layer is greater than the height of the lower surface of insulator structure and less the height of the upper surface of the insulator structure (see fig. 12).

With respect to claim 34, Matsumoto et al. discloses that the thickness of the Fin structure (10c) is greater than 40 nm (see col. 4, lines 34-36).

Allowable Subject Matter

5. Claims 10-11, 20, 24-25, 29-31 and 33 are allowed.

Response to Arguments

6. Applicant's arguments with respect to claims 1, 4, 6, 8, 32 and 34 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai v. Pham whose telephone number is 571-272-1715. The examiner can normally be reached on M-F.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HOAI PHAM
PRIMARY EXAMINER